

**Use of TiO<sub>2</sub> residues from the sulfate process**

The invention relates to the use of TiO<sub>2</sub> residues from the sulfate process.

5 The use of residues from TiO<sub>2</sub> production (TiO<sub>2</sub> residues) in the metallurgical industry is known in principle. For example, DE 4419816 C1 describes a titanium-containing additive comprising TiO<sub>2</sub> residues and further substances. DE 19705996 C2 describes a process for the production of an additive comprising TiO<sub>2</sub>. In that process, a mixture of  
10 TiO<sub>2</sub> residues and iron or iron compounds is subjected to heat treatment at from 200 to 1300°C. The laborious metering and mixing of the TiO<sub>2</sub> residues with the further constituents of the additive are disadvantageous.

15 DE 19830102 C1 describes the use of a fine-grained TiO<sub>2</sub>-containing residual substance formed in the production of TiO<sub>2</sub> by the chloride process. A disadvantage of this teaching is that such fine-grained TiO<sub>2</sub>-containing residual substances are not formed in the production of TiO<sub>2</sub> by the sulfate process and the teaching is therefore not  
20 applicable to TiO<sub>2</sub> residues from the sulfate process.

The object of the invention is to overcome the disadvantages of the prior art and, in particular, to indicate a simple use of TiO<sub>2</sub> residues from the production of TiO<sub>2</sub> by the sulfate process.

25 The object is achieved by the use of TiO<sub>2</sub> residues from the sulfate process in metallurgical processes or as a constituent of refractory materials, the TiO<sub>2</sub> residues being subjected to heat treatment and used without being mixed further with other substances.

30 Surprisingly, it has been found that, in metallurgical processes or as a constituent of refractory materials, the TiO<sub>2</sub> residues from the sulfate process develop, per se, the same desired action as the mixtures of TiO<sub>2</sub> residues and other substances provided hitherto. The TiO<sub>2</sub> residues can

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be used in the heat treatment in the unwashed state or in the washed and neutralised state.

The heat treatment of the  $\text{TiO}_2$  residues is preferably carried out at from 100 to 1300°C. The  $\text{TiO}_2$  residues can be  
5 in powder form or in the form of moulded bodies (obtained, for example, by sintering, pelletisation, briquetting or compression).

The heat-treated (dried)  $\text{TiO}_2$  residues preferably comprise the following substances as the main constituent (amounts  
10 are in wt.%):

|                |                |
|----------------|----------------|
| $\text{TiO}_2$ | from 35 to 70  |
| $\text{SiO}_2$ | from 5 to 40   |
| Iron compounds | from 2 to 15   |
| MgO            | from 1 to 15   |
| 15 CaO         | from 0.5 to 15 |

Alternatively, the heat-treated (dried)  $\text{TiO}_2$  residues can comprise the following main constituents, calculated as oxides (amounts are in wt.%):

|                         |               |
|-------------------------|---------------|
| $\text{TiO}_2$          | from 20 to 80 |
| 20 $\text{SiO}_2$       | from 2 to 30  |
| $\text{Al}_2\text{O}_3$ | from 0 to 15  |
| $\text{Fe}_2\text{O}_3$ | from 0 to 15  |
| MgO                     | from 1 to 15  |
| CaO                     | from 0 to 15. |

25 In a preferred use, the heat-treated  $\text{TiO}_2$  residues are injected into a metallurgical furnace, for example a blast furnace or electrosmelting furnace or cupola. This results in an increase in the durability of the refractory furnace lining. The  $\text{TiO}_2$  residues are further used in tap hole  
30 masses and other refractory materials.

The subject-matter of the invention is explained in greater detail by means of the following example.

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**Example 1: Working-up of a  $\text{TiO}_2$  residue from the sulfate process for use in a metallurgical furnace**

100 t of pressure filter discharge (digestion residue), which formed during digestion in the production of  $\text{TiO}_2$  by the sulfate process and had a solids content of 75 wt.% with a  $\text{TiO}_2$  content of 53 wt.% (based on the solids content), were treated in a rotary furnace at an inlet temperature of 650°C. The finely divided product which was obtained had a residual moisture content of 0.5 wt.%. The product exhibited very good pourability and could very readily be injected into a metallurgical furnace (in this case a blast furnace) by means of pneumatic feeding.

The product had the following composition (in wt.%):

|    |                         |      |
|----|-------------------------|------|
|    | $\text{TiO}_2$          | 53   |
| 15 | $\text{Fe}_2\text{O}_3$ | 5.9  |
|    | $\text{SiO}_2$          | 27.8 |
|    | $\text{Al}_2\text{O}_3$ | 6.1  |
|    | MgO                     | 2.4  |
|    | CaO                     | 4.2  |

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**Patent Claims**

1. Use of  $\text{TiO}_2$  residues from the sulfate process in metallurgical processes or as a constituent of refractory materials, characterised in that the  $\text{TiO}_2$  residues are subjected to heat treatment and used without being mixed further with other substances.
2. Use according to claim 1, characterised in that the  $\text{TiO}_2$  residues are subjected to heat treatment at from 100 to 1300°C.
3. Use according to claim 1 or 2, characterised in that the  $\text{TiO}_2$  residues are in powder form or in the form of moulded bodies.
4. Use according to any one of claims 1 to 3, characterised in that the  $\text{TiO}_2$  residues comprise the following substances as the main constituent (amounts are in wt.%):
- |                |                 |
|----------------|-----------------|
| $\text{TiO}_2$ | from 35 to 70   |
| $\text{SiO}_2$ | from 5 to 40    |
| Iron compounds | from 2 to 15    |
| $\text{MgO}$   | from 1 to 15    |
| $\text{CaO}$   | from 0.5 to 15. |
5. Use according to any one of claims 1 to 3, characterised in that the  $\text{TiO}_2$  residues comprise the following main constituents, calculated as oxides (amounts are in wt.%):
- |                         |               |
|-------------------------|---------------|
| $\text{TiO}_2$          | from 20 to 80 |
| $\text{SiO}_2$          | from 2 to 30  |
| $\text{Al}_2\text{O}_3$ | from 0 to 15  |
| $\text{Fe}_2\text{O}_3$ | from 0 to 15  |
| $\text{MgO}$            | from 1 to 15  |
| $\text{CaO}$            | from 0 to 15. |

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6. Use according to any one of claims 1 to 5,  
characterised in that the dried  $\text{TiO}_2$  residues are  
injected into a metallurgical furnace.
- 5 7. Use according to any one of claims 1 to 5,  
characterised in that the dried  $\text{TiO}_2$  residues are used  
in a tap hole mass.